

The effect of intra-accumbens nomiphensine on nicotine-induced dopamine secretion from the nucleus accumbens - a microdialysis study

M.E.M. Benwell & D.J.K. Balfour

Department of Pharmacology and Clinical Pharmacology, University of Dundee Medical School, Ninewells Hospital, Dundee, DD1 9SY, Scotland.

Previous studies suggest that nicotine preferentially stimulates mesolimbic dopamine (DA) systems and that the effect mediates the locomotor stimulant properties of the alkaloid (2,3). In our laboratory, the acute administration of nicotine has been shown to cause hyperlocomotion and a significant elevation in the extracellular concentration of the major metabolite of DA, dihydroxyphenylacetic acid (DOPAC), in the nucleus accumbens (NAc) (1). However, in these experiments, we failed to detect significant increases in extracellular NAc dopamine (DA). The present study investigated the possibility that blockade of the DA uptake mechanism would reveal the effects of acute nicotine on DA secretion in the NAc. Male Sprague-Dawley rats were anaesthetised with avertin and dialysis loops implanted stereotactically in the NAc. 24 hours later, the probes were dialysed with a Ringer solution with or without nomiphensine (10 μ M) at a rate of 1.7 μ l/min. Nomiphensine, added to the Ringer solution, caused a four fold increase (F treatment (1,7) = 46.0, $p < 0.001$) in the basal extracellular levels of DA in the NAc (Fig 1a). Under these circumstances, the acute, subcutaneous injection of nicotine (0.4mg/kg) resulted in increases in DA in the dialysate (Fig 1b) which were significant when compared with saline-treated controls (F treatment x time (6,48) = 6.32, $p < 0.01$) and animals treated acutely with nicotine (F treatment x time (6,60) = 2.85, $p < 0.05$) but with no nomiphensine in the probe. This concentration of nomiphensine had no significant effect on the extracellular concentration of DOPAC nor did it affect the increase in DOPAC (F treatment x time (6,48) = 6.48, $p < 0.01$) observed in response to acute nicotine administration. In conclusion, under the conditions used in our laboratory, NAc DA secretion evoked by acute nicotine, is only detected unequivocally when the efficiency of the DA uptake mechanism is impaired by the inclusion of an uptake blocking drug in the perfusate.

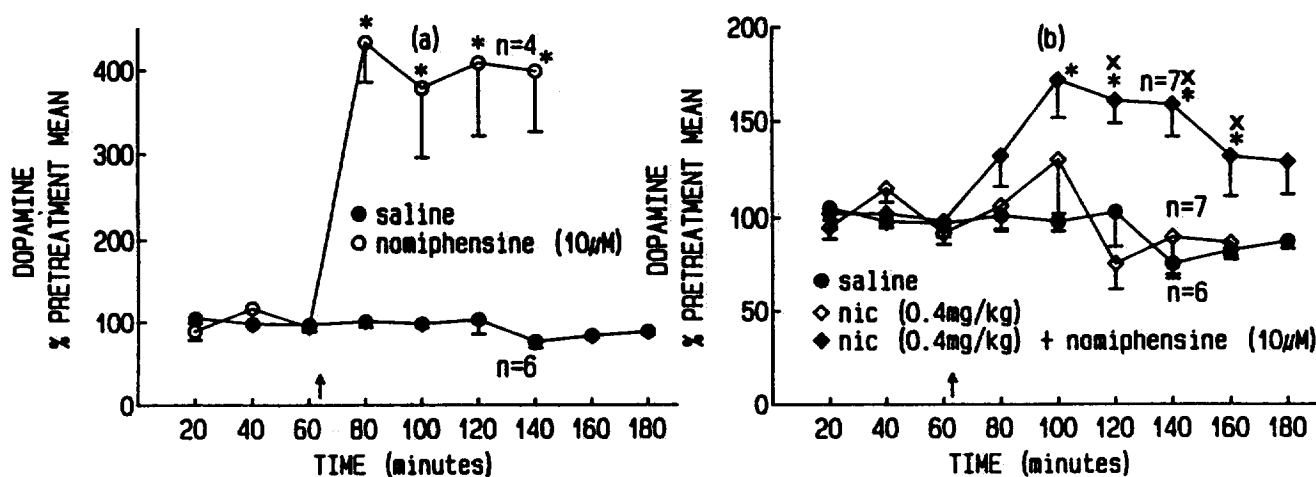


FIGURE 1 DA release in the NAc in response to the various treatments applied at the time indicated by the arrow. * $p < 0.05$ cf saline, x $p < 0.05$ cf nic.

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